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A COMMODITY PRICE INDEX OF BUSINESS CYCLES

WARREN M. PERSONS AND EUNICE S. COYLE

THE object of this study is to construct an index of wholesale commodity prices for a special purpose. That purpose is to measure changes in general business conditions during alternating periods of prosperity and depression. In other words, our problem is to select and combine series of wholesale prices of commodities in order to secure an index of business cycles. This is not the problem which, heretofore, makers of commodity price index numbers have had before them; their problem has been, rather, to measure changes in the cost of living or in the general exchange value of money. The price index of business cycles, which we present here, is a new type of index number constructed by methods adapted to the special object in view.

I. THE RESULTS

Our price index of business cycles, by months for the period 1890–1921, is presented graphically in Charts I and II (curve A). On these charts, for comparison with our index, which is based upon only 10 price series, are also presented the monthly price index numbers of the Bureau of Labor Statistics based upon 234 to 371 series (curve B), and Bradstreet's index based upon 96 series (Chart II, curve C). It is evident from these comparisons that our ten-commodity price index reveals clearly all of the cyclical movements of prices registered by the other indices. It is also evident that our index registers those cyclical movements in much more pronounced fashion, much more unequivocally, than do other indices.

Not only does our price index register emphatically the cycles of general commodity prices, but it also gives us an accurate record of the fluctuations of business and industry in general, exclusive of agriculture. The outstanding features of business in the United States, year by year, are summarized in the "Annals of Business Conditions" presented in conjunction with our charts on pp. 354–356. A comparison, year by year, of changes in the business situation as described in the tabular summary, with the fluctuations of our index in corresponding years, shows remarkable agreement between the two. In some cases, it will be noticed, our curve indicates minor movements of business which are not described in the annals of the year, as the increase and decline of 1894, 1904, and 1913; these movements, however, are in general similar to those of other indices of commodity prices, such as Falkner's, Bradstreet's, and the Bureau of Labor Statistics'. In one exceptional case, after the declaration of war in 1914, our index declined, while Bradstreet's and the Bureau's indices increased and then declined. The bulge shown by the latter indices resulted from an increase in the prices of foodstuffs, and reflected the demand for existing supplies rather than increased general industrial activity. In fact, ample evidence shows that during the autumn of 1914 business activity declined — as shown by our curve. Our index, then, appears to reflect promptly and unmistakably the changes in the business and industrial situation.

Our index is based upon commodities which are varied in nature, important in industry, unusually sensitive in price, not greatly affected by the seasons, and similar with respect to their main cyclical price movements. The commodities are: cottonseed oil, coke, pig zinc, pig iron, bar iron, mess pork, hides, print cloths, sheetings, and worsted yarns. The index based upon these 10 commodities moves, as we have said, in sympathy with the cyclical fluctuations of general commodity prices and reflects business prosperity and depression. It does not, however, measure accurately changes in levels of cost of living or in the general exchange value of the dollar. The most reliable index for the United States of the level of all commodity prices, including numerous inflexible as well as flexible price series, raw materials and consumers' goods, agricultural and manufactured products, is the index of the Bureau of Labor Statistics.[1] In years of depression, such as 1894, 1896, 1904, 1908, 1914, and 1921, the annual average of our index is considerably below that of the Bureau of Labor Statistics for "all commodities"; in years of prosperity, such as 1890, 1899, 1902, 1905–06, 1909, 1912, and 1916–18, it is much higher. The average annual increase in the two price indices, however, during the period 1897–1913, is precisely the same, namely, 2.7 points per annum (relative to the 1890–99 base). The "lines of secular trend" on Chart I present the long-time movements in graphic form.

It may seem to the reader that 10 commodities constitute too narrow a basis for a dependable index of price cycles. Examination of the list of 10 commodities will show, however, that it is widely representative of industrial activity. Minerals and important products of such manufacturing groups as iron and steel, slaughtering, hides and leather, chemicals, cotton and woolen textiles, are all included. Moreover, the prices of the 10 commodities fluctuate together during business cycles, while the prices of commodities excluded are either very inflexible, like steel rails and soda crackers, have price movements peculiar to themselves, like wheat, petroleum, and paper, or have very strong seasonal variations, like milk and eggs. The inclusion of a wide list of miscellaneous commodities with miscellaneous price movements would obscure, though probably not entirely cover up, the cyclical fluctuations which we are attempting to measure. Analysis shows that the movements of other indices of commodity prices, such as those of the Bureau and Bradstreet's, during periods of business prosperity and depression, are mainly the result of the fluctuations of the 10 commodities which we have selected and of others closely associated with those 10. (*Text continued on page 356.*)

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[1] Bradstreet's index is highly sensitive to business cycles, but because of its construction, it does not measure accurately the general price level. *Infra*, p. 364.

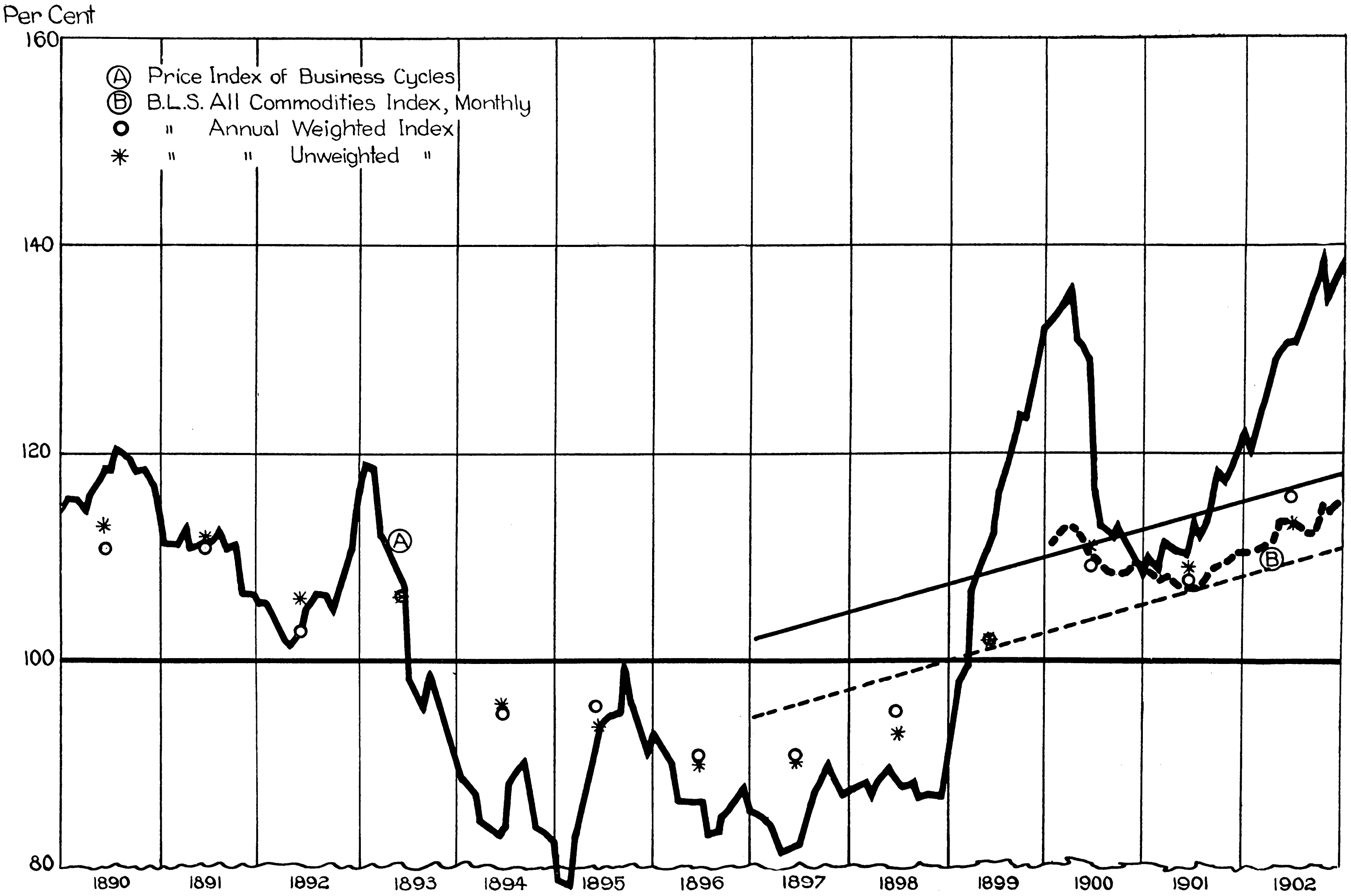

Chart I. — The Monthly Price Index of Business Cycles, 1890–1915, Compared with Two Annual Price Indices of the Bureau of Labor Statistics for All Commodities, 1890–1902, and with the Bureau's Monthly Price Index for All Commodities, 1900–15.

(*Average for 1890–99 = 100.* The price index of business cycles is a simple geometric mean of prices of 10 commodities; the weighted annual index of the Bureau of Labor Statistics assigns each commodity an importance equal to its average aggregate value in exchange, 1890–99; the other annual index of the Bureau and the monthly index are simple arithmetic means of relative prices.)

Annals of Business Conditions, 1890–1921

(Quotations for the period 1890–1911 are from Mitchell's *Business Cycles*, pp. 48–88; those for the period 1912–21 are from the *Financial Review* and The Review of Economic Statistics.)

1890. "The year . . . was one of great activity in the various departments of trade and transportation, with a volume of transactions never before equalled"; Baring failure announced in London on November 15; "mild crisis in autumn."

1891. "Liquidation in first 7 months"; "bad harvests in Europe and abundant harvests in America" with "farmers and railways first beneficiaries of this stroke of fortune."

1892. "Impetus given to business activity by the harvest situation of 1891"; "general business prosperous"; "heavy gold exports" in second half-year.

1893. "Uneasiness increased in the early months of 1893," and "in May one of the most violent panics in the country's history broke out."

1894. "Deep depression"; "failure of the corn crop"; great coal mine and railway strikes.

1895. "Revival in summer, followed by relapse."

1896. "Return of depression; panicky conditions in financial markets"; "the situation improved greatly" after election "in contrast with that of July to October."

1897. "First half dull; second half great improvement on crop situation"; Dingley tariff became law on July 24.

1898. "Revival of business . . . with two brief pauses," one in the spring just before war broke out with Spain, and one in the autumn just before the congressional election; "cotton, woolen, and leather industries," however, "in unsatisfactory condition"; "the last month of the year was also the best."

1899. "General business had not been so buoyant since the great revival of 1879–81."

1900. "Pause of activity"; "commodity prices declined, new orders fell off, the iron and steel trade gave signs of overproduction, and from July to October clearings outside New York were less than the year before."

1901. "Prosperity in general business"; "unparalleled car shortage developed in the autumn."

1902. "Abounding prosperity in business"; "brilliant harvests"; heavy railway traffic.

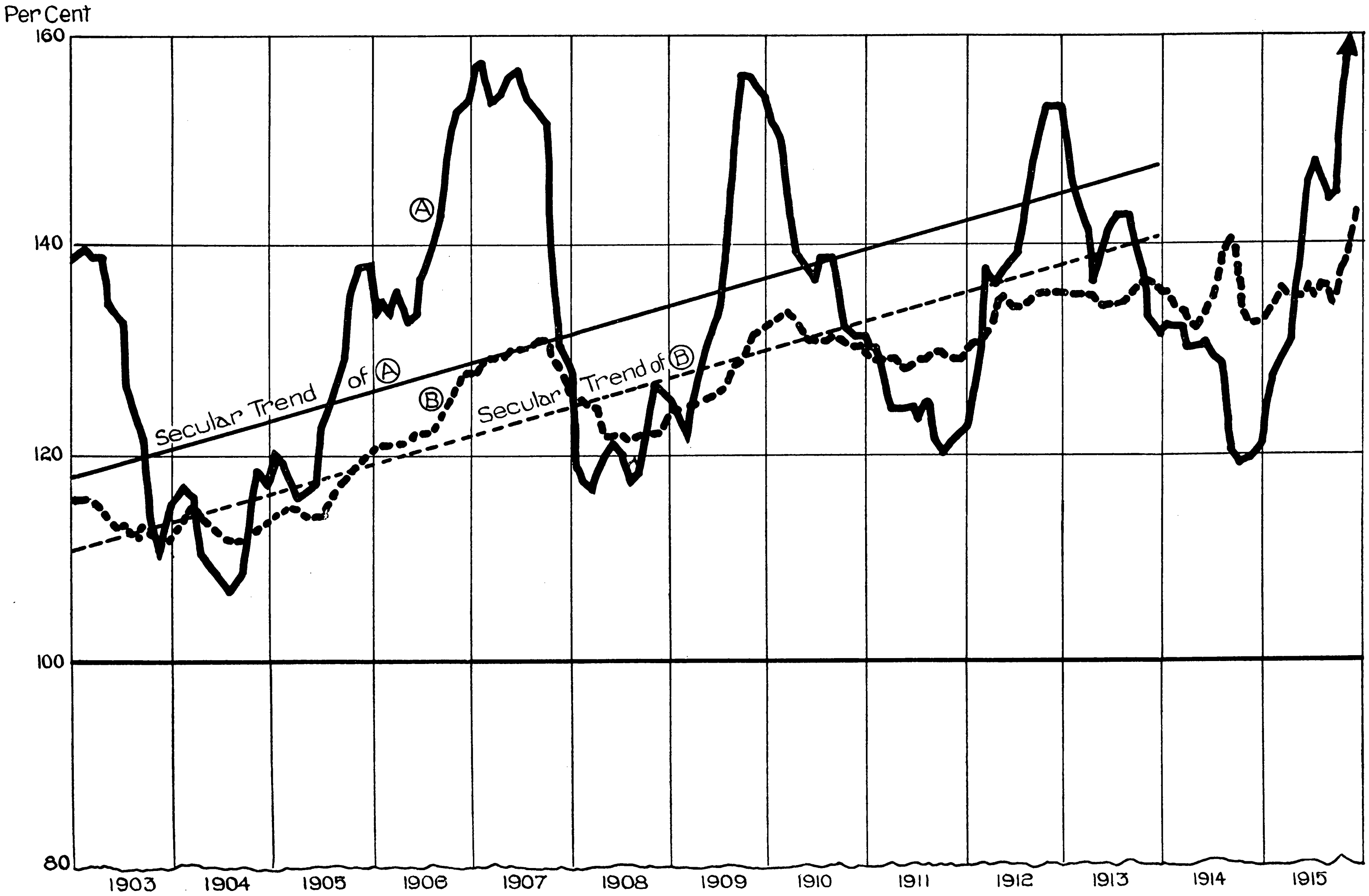

Chart I. — The Monthly Price Index of Business Cycles, 1890–1915, Compared with Two Annual Price Indices of the Bureau of Labor Statistics for All Commodities, 1890–1902, and with the Bureau's Monthly Price Index for All Commodities, 1900–15.

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1903. Great "financial liquidation" throughout the year; "rich man's panic"; depression in iron and steel industry in second half-year; "manufacturers in many other branches complained of smaller orders, of increased expenses, etc."

1904. "Moderate losses" in business "in the first 7 or 8 months"; "toward autumn the assurance of abundant harvests, save for wheat, encouraged the business public"; "reaction was terminated."

1905. "Rapid gain in prosperity"; "abundant crops"; volume of trade and production "expanded month after month."

1906. "High tide of prosperity"; "business prosperity . . . more intense than in 1899 and 1901."

1907. "Recession of business activity antedated the panic by several months"; "crisis, and severe panic in October to December."

1908. "Deep depression in trade and industry"; "industrial paralysis;" "the last quarter brought a distinct increase in the volume of general business."

1909. During the early months "business was conducted in a rather cautious manner"; "recuperation, marked in second half-year"; "in the second half-year the output of pig-iron broke all records"; "good crops."

1910. "The tide was ebbing"; "in April pig-iron production began a long decline"; "return of depression in second half-year."

1911. "Mild depression"; "new construction dull"; trust prosecution; "depression relaxed somewhat toward the end of the year."

1912. "Uninterrupted trade expansion from beginning to end"; crops abundant.

1913. "Volume of trade well maintained" in first half-year "on basis of old orders" but in second half "activity slackened sensibly"; "short crops," especially in corn; railroads suffered from increasing expenses and fixed rates.

1914. "Industrial situation" grew "steadily worse"; "business in most lines of trade very much depressed"; "railroads prostrate"; iron and steel trades at "low ebb" throughout, with "steel mills operating at only 30–35 per cent capacity" at year's end; outbreak of war brought "utter demoralization."

1915. Recovery under stimulus of war trade, slow in first 8 months, but by end of year complete; South depressed until last third by drop in cotton prices.

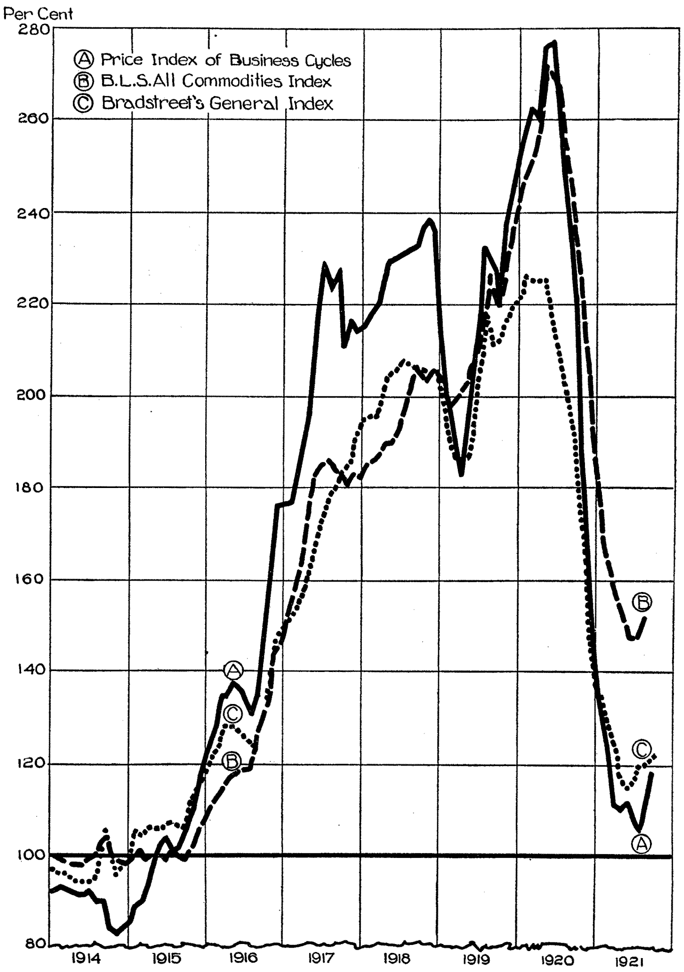

Chart II. — The Price Index of Business Cycles Compared with the Price Index of the United States Bureau of Labor Statistics for All Commodities and with Bradstreet's General Index of Commodity Prices, Monthly, 1914–21.

(*Average of 1913 = 100.* The price index of business cycles is a simple geometric mean of prices of 10 commodities; the index of the Bureau of Labor Statistics is a weighted aggregate of actual prices, reduced to percentages; Bradstreet's index is an aggregate of actual per pound prices, reduced to percentages.)

1916. Internal and external trade reached "record proportions"; business was "uninterruptedly active and grew steadily in volume"; "agricultural outturn was generally poor and unsatisfactory."

1917. United States entered war; "business continued active throughout year" despite fuel and labor shortage; these, added to freight congestion at end, "prevented capacity production"; price fixing by federal government began in August.

1918. Opened with great coal scarcity and freight congestion in eastern half of country; war industries stimulated, but others, notably the automobile, stringently restricted and regulated; after the armistice came cancellation of government contracts and swift "demobilization of industry."

1919. "Readjustment of industry to peace conditions"; "agriculture prosperous"; though some lines of manufacture showed "distinct recession" in first half, second half brought "rapid recovery," and volume of business for year was large; mineral output, however, "declined materially."

1920. "Opened active"; but "liquidation of commodities" began in late spring; by autumn, deep depression.

1921 (9 months). "General depression and continued liquidation" for first half, despite recoveries in a few industries, like textiles; beginning of an "upward swing" in second half.

Bradstreet's index, for instance, reflects general business prosperity and depression. Apparently it does this because of all the 96 commodities upon which it is based; in reality these cyclical movements result from changes in price of only a few commodities, such as cotton fabrics, hides and leather, and cured meats, which are flexible in price and happen to be very heavily weighted by Bradstreet's method of taking an aggregate of "per pound" prices. Instead of including a large number of commodities, a few of which have great influence but most of which have little influence on the result, it is better for our purpose to include a limited number of carefully selected commodities with homogeneous cyclical price movements. One advantage of an index constructed in this way is that changes in the index may be traced to their sources in individual commodities without undue labor.

The price index of business cycles is extremely sensitive to changes in general business conditions — much more so than are price indices constructed for other purposes. The amplitude of fluctuations of our index, from peak to trough and trough to peak, during the period 1900–14 ranged from 28 to 51 points and averaged 36 points, compared with a range of 4 to 19 points and an average of 9 points for the index of the Bureau. It is interesting to note that the prices of certain commodities, such as our 10, always increase much more than do others in times of prosperity and decrease from the peak much more than do others in times of business recession. In other words a "normal" relationship between the prices of various commodities for one phase of the business cycle is not "normal" for another phase.

A final word of comment may be added. The facts, first, that our index is based mainly on materials used in manufacture, such as cottonseed oil, coke, pig zinc, pig iron, bar iron, hides, and worsted yarns, and second, that it fluctuates much more violently during the transition from depression to prosperity and from prosperity to depression than do indices based largely upon consumers' goods, suggest the following generalization relating to business cycles: As a period of prosperity develops, the costs of materials regularly outrun the prices of finished goods; the values of manufacturers' inventories of materials increase disproportionately to selling prices and to business done, even with a constant physical volume of stocks and production; paper profits accumulate; the attempt to realize these profits through increased selling prices always fails ultimately; a decline in the costs of materials then occurs and is followed by general price declines and business recession; costs of materials decline more drastically than do selling prices; at these new costs and selling prices manufacture again becomes profitable; business revives, and the cycle is complete.

II. DATA AND METHODS

The result of the present study — a price index of business cycles based upon a small number of commodities — is one which we did not foresee at the outset. When the study was undertaken, we planned first to construct price indices for agriculture, for mining, and for each of the manufacturing groups, such as textiles, leather, and food products, as classified in the United States census of manufactures. Our thought was that the price indices for the various groups, with the possible exception of agriculture, would then be combined into a single index, in which each constituent group index would be weighted according to the industrial importance of the industries represented. In this way, it seemed to us, we could obtain a useful commodity price index of business cycles. As described in the present section on "Data and Methods," however, our investigations showed that the selection of a large number of commodities, in order that all phases of industry might be represented, was inconsistent with our main purpose — the construction of a sensitive index of business cycles. In other words, the original steps in the investigation described in the present section proved that a commodity price index of business cycles should be constructed according to a different method than that first devised. A full account of the course of our investigation is necessary in order that the reasons for our conclusions may be understood.

For our purpose — the measurement of business cycles by changes in commodity prices — monthly price data for numerous commodities were necessary. Such data may be found in the wholesale price *Bulletin of the United States Bureau of Labor Statistics* and in *Bradstreet's*. Since the price series of the *Bulletin* cover more commodities, a longer period, and are more conveniently arranged than those of *Bradstreet's*, the former were selected for the present investigation. These monthly prices, covering upwards of 300 commodities for the period 1903–14, were examined, and selections of price series were made on the basis of suitability for our purpose. The period 1903–14 was chosen for study because it is the most recent normal period, it offers extensive data, and its characteristics have been determined by previous studies.

The monthly indices of wholesale prices of the United States Bureau of Labor Statistics show three pronounced wave movements of prices during the period 1903–14; the first culminated in 1907, the second, early in 1910, and the third in 1912. Bradstreet's monthly indices also show three wave movements during the period named which are even more pronounced than those of the Bureau indices. The crests and troughs of the waves of Bradstreet's indices, however, tend on the whole to precede somewhat those of the Bureau.[2] Other statistical series than wholesale prices also show a three-wave movement, more or less similar to that for prices, during the period 1903–14. Such series are bank clearings outside New York City, imports of merchandise into the United States, unfilled orders of the United States Steel Corporation, and tonnage of pig iron produced in the United States.

Examination of the available statistical data, then, makes it appear fairly certain that the three-wave movement of prices during 1903–14 is characteristic, not only of prices, but of business in general.[3] But is this movement of average prices also representative of various groups and sub-groups of industries? Is the general price movement similar to the price movements in the three great industrial groups, agriculture, mining, and manufacture, and in the sub-groups of manufacture, such as food products, textiles, iron and steel, leather, paper and printing, chemicals, and non-ferrous metals? In an attempt to answer these questions the 340 series[4] of price quotations of the Bureau of Labor Statistics, given in *Bulletin No. 181*, were sorted into industrial groups. The criteria adopted for selection and rejection of the price series available for 1903–14 will now be considered.

SELECTION AND CLASSIFICATION OF DATA

The field of choice was restricted to commodities which fell within the classification already used in the Index of Physical Production; viz., agricultural crops, minerals, and products of domestic manufacture.[5] Within this field were taken representative commodities, important in exchange and sensitive in price, for which there were comparable quotations covering the years 1903–14. Of the 340 series quoted in the *Bulletin*, 91 met these standards. The 249 rejections were due to the following reasons:

(1) Ninety-six series were rejected because the quotations were not complete for the period 1903–14. The series on leaf tobacco, however, though not published by the Bureau previous to 1908, was retained and carried back to 1903 by the use of quotations from *Bradstreet's*.

(2) Twenty series were outside the classification adopted.[6] For instance, agricultural products such as live stock and milk were rejected because they were not included in our index of physical production for agriculture.

(3) Seventy-three series were rejected because they were relatively unimportant. That is, they were rejected because their total exchange value

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[2] Charts showing the cyclical fluctuations of these and other series are given on pp. 198–205 of the REVIEW for April, 1919.

[3] See the Index of General Business Conditions on pp. 112, 113 of the REVIEW for April, 1919.

[4] Throughout this section, each series of price quotations is counted as one commodity, though it may really pertain to but one description of a commodity. Thus, the four series of quotations for different grades of anthracite coal are counted as four commodities.

[5] See the REVIEW, September, 1920–January, 1921, "An Index of the Physical Volume of Production," by E. E. Day.

[6] The series rejected for this reason were: live stock (6 series), raw wool (2 series), eggs, milk, coffee, tea, pepper, jute, silk (2 series), opium, tin, rubber, beans. (Though beans fall within the classification "agricultural crops," they were omitted as the only agricultural series for which prices were given in the *Bulletin* not entering also into the index of physical production for agriculture.)

according to the census of 1909 was less than $10,000,000, or because the value added by the entire industry producing the commodity in question was less than 3 per cent of the total value added for all industries in the same group as classified by the census of 1909.[7]

(4) Eight series were rejected because three or more materially different descriptions of the commodity were quoted during 1903–14. The homogeneity of these series is doubtful.[8]

(5) Thirteen series, such as bread, watches, and Bessemer rails, were rejected because each averaged only one or less than one price change per year during the 12 years 1903–14.[9]

(6) Thirty-three series were rejected because they were duplicated by, or inferior to, price series which were retained.[10]

(7) Six series were rejected because they were considered inadequate to represent the industry producing the articles quoted.[11] Thus, the price of oyster crackers was not considered sufficiently representative of the industry "bread and bakery products" to be included in our list of price series. Other series available for the industry, bread and soda crackers, were rejected because of their inflexibility.

Of the 91 series which survived the tests, 12 pertained to agriculture, 9 to mining, and 72 to manufacture.[12] Distributing the series under manufacture among the industrial groups recognized by the census gave food 13, textiles 21, iron and steel 8, lumber 5, leather 6, paper 2, liquors 3, chemicals and allied products 10, stone, clay and glass 4. Tobacco, non-ferrous metals, vehicles, railroad repair shops, and the miscellaneous group were not represented. Among the groups for which price series were secured the lumber, paper, and liquor groups were thought to be represented by too few series to make the computation of indices for such industrial groups worth while. Consequently, the sorting out of the wholesale prices quoted by the Bureau of Labor Statistics resulted at length in the selection of 81 series pertaining to crops or minerals, or to products of the food, textile, iron, leather, chemical, and stone and glass industries. A list of the series utilized for the classes of commodities just named, together with information concerning the type of quotations (spot, contract, etc.), and the weights adopted, are given in Table 1 on p. 367.

Indices for Industrial Groups

In constructing price indices for the groups of commodities selected, a geometric average with constant weights was used. The steps of the process were: transcribing relative prices, weighting commodities and industries, averaging groups of weighted prices geometrically.[13]

The weighting of the commodities was so far as possible the same as that used in the Index of Physical

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[7] The series rejected for this reason were:

(*a*) Exchange value in 1909 was less than $10,000,000.

Hops
Onions
Sulphur, crude
Quicksilver
Salt beef
Buckwheat flour
Rye flour
Pickled cod
Herring
Salt mackerel
Currants
Prunes
Cotton bags
Blankets (3 series)
Carpets (2 series)
Linen shoe thread
Wool flannel
Underwear
Cotton warp dress goods
Overcoatings (2 series)
Cut nails
Gray forge pig iron
Cutlery (2 series)
Chairs (2 series)
Tables
Woodenware (2 series)
Tar
Zinc oxide
Candles
Wood alcohol
Muriatic acid
Alum
Quinine
Earthenware (3 series)
Glassware (3 series)
Putty
Sheet zinc
Lead pipe

Exception: Six textile series (2 brown sheetings, 3 cotton warp dress goods, and black twill overcoatings) were not rejected even though the value was only 5 to 8 million dollars.

(*b*) Value added by manufacture for the industry producing the commodity was less than 3 per cent of the "value added" for the group in 1909.

Canned salmon
Glucose
Starch (2 series)
Vinegar
Tin plate
Tools and hardware (15 series)
Salt
Linseed oil
Tallow

[8] The series rejected for this reason were:

Men's hose
Brown sheetings
Serge dress goods
Worsted trouserings
White pine doors
Bedroom sets
Men's boots
Smoking tobacco

[9] The series rejected for this reason were:

Bread (2 series)
Soda crackers
Carpets
Combed yarn hose
Underwear
Broadcloths
Bessemer rails
Matches
Toilet soap
Bicarbonate of soda
Lime (inflexible after 1907)
Tobacco, plug

Exception: Two series, cotton thread and sulphuric acid, were not rejected; they were inflexible, however, and should have been omitted on that count.

[10] The series rejected for this reason were:

Anthracite coal (3 series)
Semibituminous (2 series)
Butter (2 series)
Bacon
Cornmeal, yellow
Molasses
Gingham
Calico
Cotton yarn
Cotton flannels, 2 series
Drillings
Tickings
Shirtings (3 series)
Worsted suitings
Pig iron, (2 series)
Lumber (4 series)
Shingles (2 series)
Men's shoes, vici calf
Rosendale cement
Plate glass
Window glass

[11] The series rejected for this reason were:

Oyster crackers
Evaporated apples
Raisins
Carded yarn hose
Manila rope
Sheet copper

[12] Two of the manufacturing series, pig iron and coke, appear also in mining, but count only once in the total.

[13] Either actual or relative prices could have been transcribed, since the Bureau of Labor Statistics publishes both, but there being a slight advantage in favor of the relatives, these were taken. To secure its relatives, the Bureau first reduces all actual figures to monthly averages (if they are not already in that form) by summing the mean prices falling within each month and dividing by their number. If quotations are lacking for a month or a few months, the Bureau ordinarily leaves a gap, but in this study missing figures were supplied by repeating the last monthly average preceding. Taking the monthly prices, then, the Bureau finds what per cent each of them bears to the average of the years 1890–99, or to the average of as many of those years as there are prices for. The only difficulty in thus computing the relatives comes in those series in which substitutions have occurred. Since the price of the substituted articles is generally not available for 1890–99, relatives cannot be figured directly. The Bureau therefore figures them indirectly on the basis of a year's overlap between the prices of the introduced and the discontinued article. It assumes that the relative which applies in that year to the price of the discontinued article applies equally to the price of the article introduced, since by choice the latter is supposed to be "practically identical" with the former. In every subsequent year, the new relative is found by rule of three: actual price in the given year is to actual price in

Production. Crops and minerals were weighted in proportion to the yearly average aggregate value of their production in the period 1909–13. The omission of gold from the minerals, however, and of the value of cottonseed from the aggregate value of cotton marked two variations from the weights formerly used. For manufactured products, lack of data made more variations necessary.[14]

Because of the weighting first, of commodities, and second, of industries, in all the manufacturing groups except one (stone, clay, and glass) the geometric means for these groups were computed by two averagings. First, the commodity prices within each industry, weighted (as in the food group) or unweighted (as in the iron and steel group), were averaged by months from 1903–14. This gave a price index for each industry.[15] Then the industries within each group, weighted according to the value added by manufacture, were averaged. This gave a price index for each group. But where there was a single scale of weights, as in agriculture, in mining, and in stone, clay, and glass products, the price index for each group was computed directly by taking the geometric mean by months of the weighted relative prices.

The price indices just described for agriculture, mining, and various manufacturing groups and industries are presented in Charts III and IV, following. The object of the computation of these indices was, as we have said, to determine whether any discernible "typical" cyclical fluctuation runs through the prices of all commodities, or whether there are certain groups of commodities which have fluctuations peculiar to themselves. If the second possibility should prove true of certain groups of commodities, then, in order to secure a commodity price index of general business conditions *based upon industrial groups*, the unsuitable groups would have to be rejected on the basis of our findings.

CLASSIFICATION OF GROUP INDICES

Our problem, then, was to sort the 13 price indices for industrial groups which we had computed into, first, those having a typical cyclical fluctuation for the period 1903–14, and, second, those having fluctuations peculiar to themselves. We took as our "typical cyclical fluctuation for the period 1903–14" the wave movement shown by the general price indices of both Bradstreet's and the Bureau of Labor Statistics as well as by numerous non-price series; the crests of these waves, it will be remembered, are in 1907, 1910, and 1912. The "typical cyclical fluctuation" of commodity prices during the period 1903–14 is described more fully below. Conformity or non-conformity to this standard was our criterion for sorting the 13 curves into two classes.

1904–05. Prices reached low points in the second half of 1904 or first half of 1905.

1905–06. Prices moved upward with little interruption during the greater part of these years. At the end of 1906 prices reached the highest points recorded in the two years' upward trend.

1907. Prices continued strong but culminated, in most cases before the last quarter of the year. Great weakness of commodity prices developed in the last three months of 1907.

1908. Prices, for the most part, reached low points before the end of the year and the beginnings of recovery were in evidence during the fourth quarter.

1909. Prices, for the most part, were strong throughout the year.

1910–11. Prices culminated in the first quarter of 1910 and were weak during the remainder of the two-year period.

1912. Prices turned upward during the first quarter and were strong throughout the year.

1913–14. Prices culminated at the end of 1912 or beginning of 1913 and were weak in 1913–14.

The result of sorting our 13 curves into two classes showing, respectively, typical and non-typical price fluctuations is given in Charts III and IV. It will be noticed that the curves with typical cyclical fluctuations are for mining and for manufactures of iron and steel, leather, chemicals, and textiles; the curves with non-typical cyclical fluctuations are for agriculture, for the group of industries manufacturing food products, the prices of which are related to the prices of agricultural products, and for the stone, clay, and glass manufacturing group. This last named group consists of only 4 miscellaneous series, brick, cement, plate glass, and window glass. It appears, then, that a list of industrial groups suitable because of similarity of cyclical fluctuations for a commodity price index of general business conditions should include mining and certain manufacturing industries, but should exclude agriculture and industries manufacturing articles of food.

If the commodity price index of general business conditions which we desired to construct was to be based on various industrial groups of commodities, it was clear

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the preceding year as the desired relative is to the relative of the preceding year. The same method is followed for months as for years, so that relative prices throughout are adjusted for substitutions. Since the actual prices are not so adjusted, and since either actual or relative prices can be used with the same result in computing geometric means, the relatives rather than the actual prices were transcribed.

[14] It was our aim to weight the commodities in each group by the value of the product in 1909, and the industries by value added by manufacture in 1909. In fact, this plan was closely followed only in the food and the chemical groups. Each food, as butter, fresh beef, flour, etc., was assigned a weight proportionate to the value of the product in 1909, and each industry, as butter, cheese, and condensed milk, slaughtering and meat packing, etc., a weight proportionate to the value added by manufacture for that industry in 1909. In the textile group, though industries were weighted as proposed, commodities within each industry were weighted by value of product in 1914, for which year there was fuller information than for 1909. In the iron and steel and the leather groups, data on the value of the products for which there were prices were so incomplete that no weights were assigned directly to the commodities in these groups. The industries in them, however, were weighted by value added by manufacture in 1909. In the stone, clay, and glass group, finally, each commodity was given an importance proportionate to its 1909 value, but the commodities being too few to be classified by industries, there were no industry weights. Due to such compromises, the weighting of manufactured commodities did not correspond so closely to that used in the Index of Physical Production as did the weighting of crops and minerals.

[15] Separate indices were not computed, however, for the industries in the chemical group, because of the small number of price series within each industry.

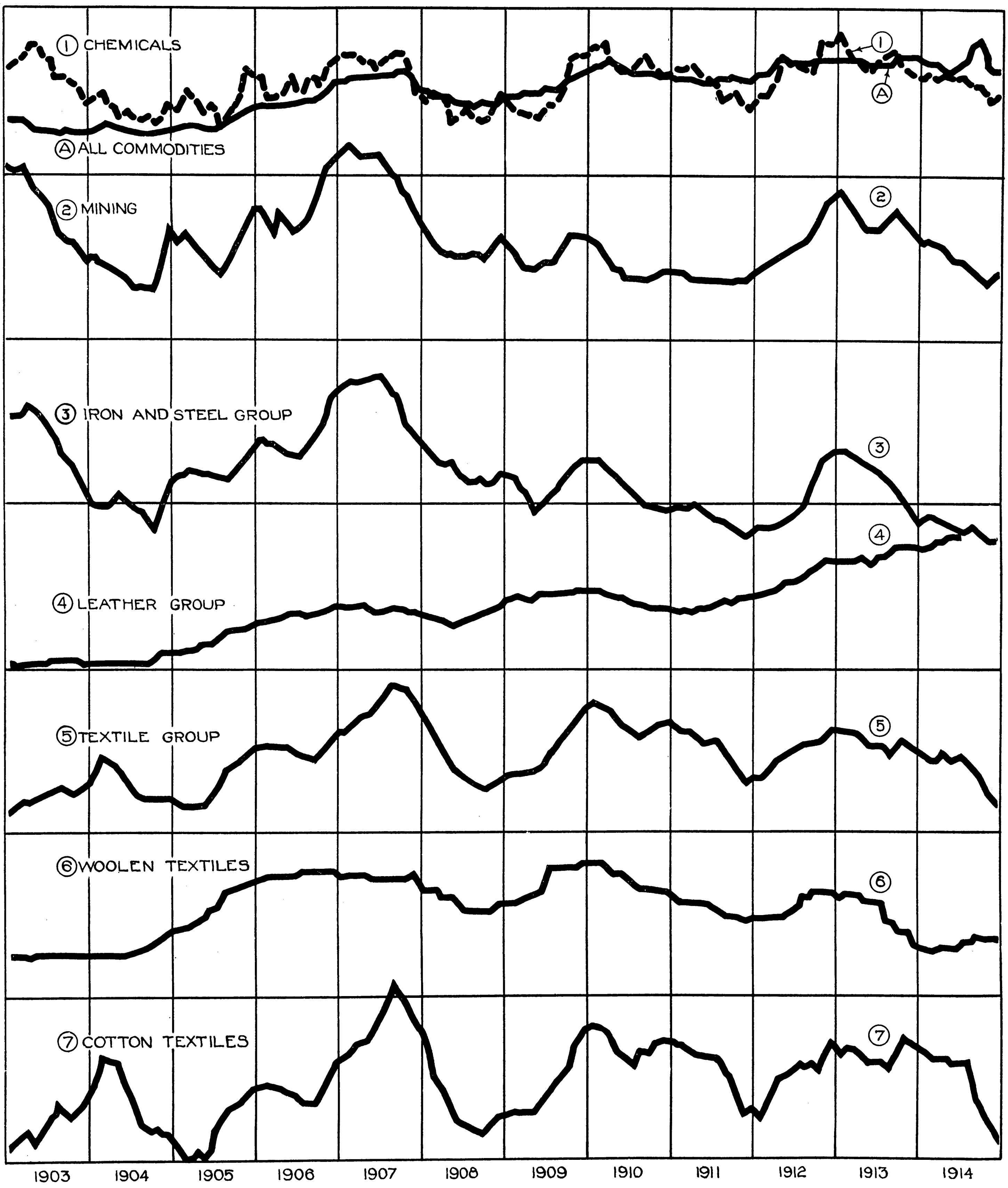

CHART III. — MONTHLY PRICE INDICES FOR VARIOUS INDUSTRIES AND INDUSTRIAL GROUPS HAVING CYCLICAL FLUCTUATIONS LIKE THOSE OF THE INDEX FOR ALL COMMODITIES OF THE UNITED STATES BUREAU OF LABOR STATISTICS, 1903–14.

(*Average for 1890–99 = 100.* The vertical scale for each section of the chart runs from 100 per cent to 150 per cent. The index for all commodities is a simple arithmetic mean of relatives; the other indices are weighted geometric means.)

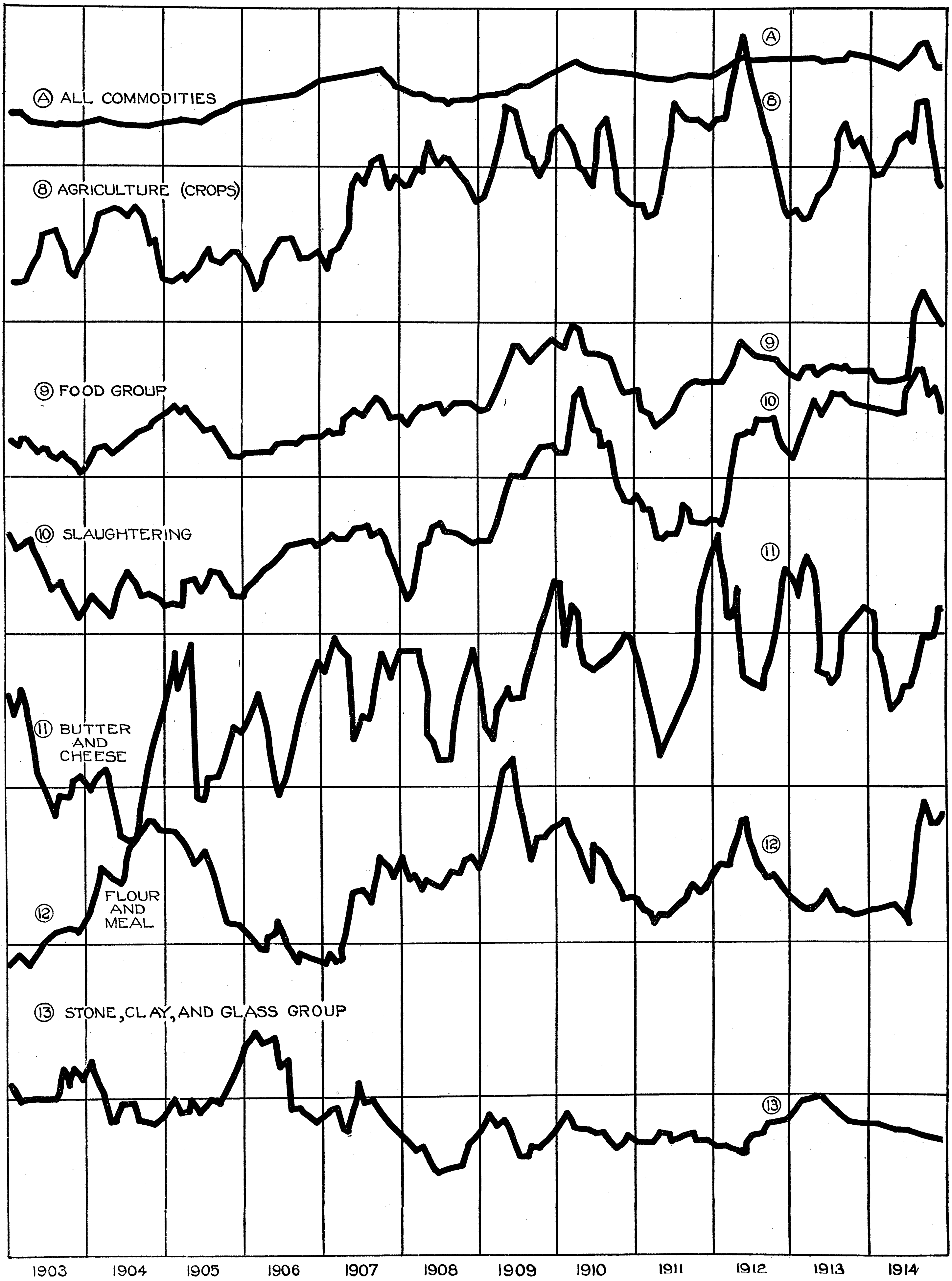

Chart IV. — Monthly Price Indices for Various Industries and Industrial Groups having Cyclical Fluctuations Unlike those of the Index for All Commodities of the United States Bureau of Labor Statistics, 1903–14.

(*Average for 1890–99 = 100.* The vertical scale for each section of the chart runs from 100 per cent to 150 per cent. The index for all commodities is a simple arithmetic mean of relatives; the other indices are weighted geometric means.)

that certain groups having non-typical fluctuations should be excluded. But would it not be preferable to base our index not upon groups of series but upon selected individual price series? The fact that the price indices for certain manufacturing industries and groups of industries and for agriculture show a non-typical fluctuation during the period 1903–14 does not demonstrate that *individual price series* in such industries or groups of industries also have a non-typical movement. The lack of correspondence of the index for crops, for instance, to the index of general commodity prices may have resulted, not because the series that enter the crop index are all non-typical, but because constituent typical series are combined with non-typical series; by such a combination the typical fluctuations of certain constituents might be offset by the non-typical fluctuations of other constituents. With this in mind, we examined the crop index. The most important commodities included in the crop index are corn, cotton, hay, and wheat. Chart V presents the monthly price indices for these four crops for the period 1903–14. From this chart it will be seen that one of the 4 series, cotton, has a cyclical fluctuation somewhat similar to that of prices in general. It will also be noticed that the fluctuations of the 4 series do not bear a family resemblance to one another.[16]

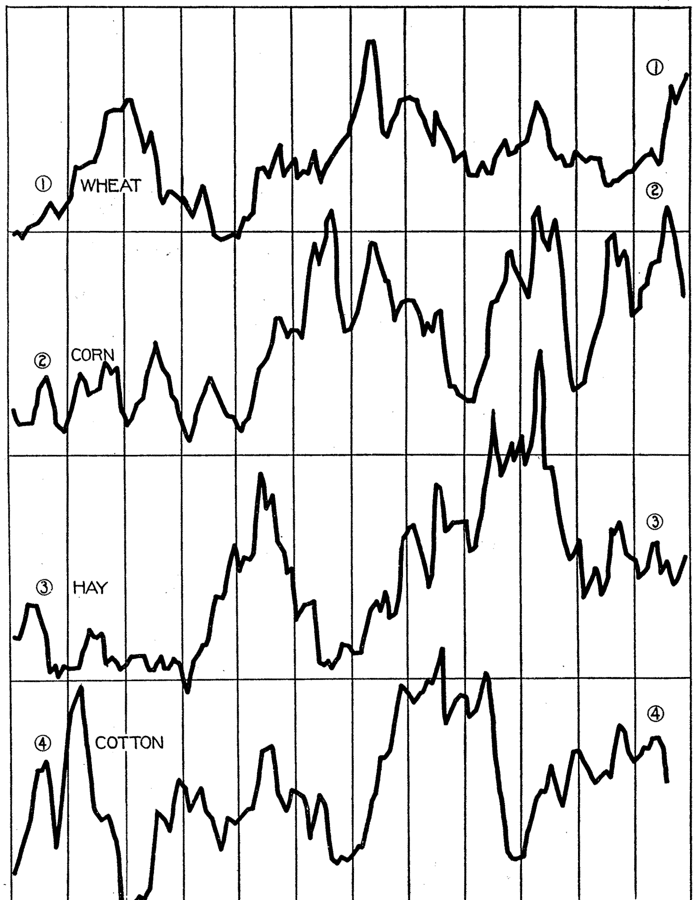

Chart V. — Relative Wholesale Prices of Wheat, Corn, Hay, and Cotton.

(*Average of 1890–99 = 100.* The vertical scale for each section of the chart runs from 100 per cent to 200 per cent.)

The results secured thus far indicated that individual series, rather than industrial groups of series, constitute the proper material for the construction of a commodity price index of general business conditions and, therefore, that individual commodity price series should be examined for typical cyclical fluctuations. The question arose, what individual price series should be selected for examination as to the nature of their cyclical fluctuations during the period 1903–14? It was obviously unnecessary to reëxamine all of the series published by the Bureau of Labor Statistics. The series listed in Table I were selected as the most important and most flexible price series available for commodities appropriate for the construction of price indices paralleling our indices of physical production for crops, mining, and manufactures. These series, it was clear, constituted suitable material for examination with respect to their cyclical fluctuations. In addition, certain other series not included in Table I constituted suitable material for examination. Thus, certain important commodities, although formerly excluded because of the classification originally adopted, were added to our revised list of series for examination. These commodities are: cattle, hogs, sheep, raw wool (2 series), silk (2 series), jute, and rubber. Other articles, linseed oil, glucose, tin plates, beans, and two paper series, were added in order to make the variety of commodities included in the revised list as wide as possible.

Classification of Individual Price Series

Table 2 gives the results of a threefold classification of the individual commodity price series listed in Table 1, and certain additions. The series have been sorted according to a single criterion: do their cyclical fluctuations correspond to the typical movement for 1903–14 described in the summary on p. 359? The series which fluctuate in non-typical fashion (including those which are relatively stable or inflexible) are classified as "clearly unsuitable" for an index; another group of series falls into the class "fairly suitable but inferior to others"; a third group of 22 series is "clearly suitable" for an index. Of the 22 clearly suitable series only 10 have been selected for an index, since it seemed unnecessary to include several series pertaining to a single industry where one or two series would apparently be sufficient. The 10 series chosen for the index were selected to give representation to as many industrial groups as possible, with duplication of series for an industry only in case the importance of that industry warranted such duplication. The 10 commodities printed in italics constitute our selection for a commodity price index of general business conditions. They were selected because, first, their prices have cyclical fluctuations corresponding to the cycles of business during 1903–14 and second, their prices are very highly flexible.

Description of Our Ten-Commodity Index

Prices for these 10 commodities, which up to this point we had secured only for 1903–14, were now car-

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[16] Corn and wheat only, among the four series, have cyclical fluctuations fairly similar to each other.

TABLE 2. — CLASSIFICATION OF IMPORTANT COMMODITY PRICE SERIES WITH RESPECT TO THEIR SUITABILITY FOR A PRICE INDEX OF BUSINESS CYCLES

(*a*) *Clearly suitable* (the 10 commodities selected for the index are in italics):

Chemicals		*Cottonseed oil* *Coke*
Mining		*Coke* *Pig zinc* *Pig iron*
Iron and steel		*Pig iron* *Bar iron* (1) Bar iron (2) Steel billets *
Slaughtering		Bacon † Hams † Lard *Pork, mess* *Hides*
Leather		*Hides*
Textiles	Cotton	Sheetings (4) Shirtings Denims Cotton yarns *Print cloths* *Sheetings* (1)
	Woolen	*Worsted yarns* (1) Worsted yarns (2) Suitings (1) Suitings (3)

(*b*) *Fairly suitable but inferior to others:*

Hogs †
Sheep †
Cotton

Silver, bar
Tin

Drillings *
Ginghams *
Sheetings * (2)
Sheetings (3)
Women's dress goods * (1)

Women's dress goods * (2)
Silk (1)
Silk (2)

Steel sheets *

Calf leather *
Harness leather *
Sole leather * (1)
Sole leather (2)
Women's shoes

(*c*) *Clearly unsuitable:*

Barley
Beans
Cattle
Corn †
Flaxseed
Hay
Oats
Potatoes
Rice
Rye
Sugar, raw
Tobacco
Wheat
Wool,* raw (1)
Wool,* raw (2)

Anthracite coal
Bituminous coal
Copper, ingot
Lead, pig
Petroleum, crude

Butter †
Cheese †
Beef, fresh
Mutton, fresh †
Wheat flour (1)
Wheat flour (2)
Corn meal
Sugar, granulated
Glucose

Cotton thread *

Overcoatings *
Suitings * (2)
Women's dress goods * (3)
Women' dress goods * (4)
Rope *

Jute
Nails *
Wire * (1)
Wire * (2)
Tin plate *

Men's shoes *

Wrapping paper
Newspaper

Rosin
Carbonate of lead *
Petroleum, refined (1)
Petroleum, refined * (2)
Sulphuric acid *
Glycerin
Cottonseed meal
Linseed oil
Spirits of turpentine

Brick
Cement *
Glass, plate *
Glass, window

Rubber

* Inflexible compared with price series of similar commodities.
† Seasonal movements obscure cyclical fluctuations.

ried back as far as available and brought forward to current months. The actual prices published by the Bureau of Labor Statistics for 1890–1902 and 1915–19 were taken, since the *Bulletins* do not contain relative prices by months for the earlier period nor relative prices on the 1890–99 base for the later period. Quotations for all 10 products, during the whole or during much of the time covered, pertain to the first day or first week of the month, but monthly average prices are given in part.[17] While shifts between first of month prices and monthly averages, or vice versa, make preceding and subsequent figures not fully comparable, no adjustment on this account was thought necessary. Adjustments due to material changes in the description of articles quoted had been made by the Bureau of Labor Statistics in the relative prices transcribed for 1903–14.[18]

In a few cases, figures were missing, as for worsted yarns in November 1919 and worsted yarns and sheetings in December 1919. Ordinarily such figures were supplied by repeating the last previous quotation. For cottonseed oil, however, there were no quotations from May 1918 through May 1919, and here figures were interpolated by assuming that cottonseed oil prices fluctuated like the average price of the other nine commodities.[19]

To supplement the 10 fairly continuous series obtained from the Bureau of Labor Statistics for 1890–1919, first-of-month prices for 1919 to date were transcribed from other sources: viz., bar iron from the *Iron Age*, worsted yarns from the *Textile World Journal*, and the eight other series from *Bradstreet's*. Where possible, articles identical with those selected from the Bureau were taken from these sources, but a few commodities could be matched only roughly. For example, cottonseed oil, refined, was replaced by cottonseed oil, crude, and spelter in the New York market by spelter in the St. Louis market.[20] Such differences, however, were allowed for *en masse* in the computation of the index, described below.

The method of combining these 10 series into a price index differed from the method used above in constructing indices by industrial groups for 1903–14 in that the series were not weighted; that is, our ten-commodity price index is an unweighted geometric mean of prices relative to the base 1890–99. Due to the fact that actual prices were transcribed for some years, and relative prices for others, the details of the computation for the period 1890–1919 varied, but the results are homogeneous. For 1919–21, the prices from *Bradstreet's* and the other trade journals were first combined into an index relative to 1919 as base. We thus found two sets of index numbers for 1919, the first computed from the prices of the Bureau of Labor Statistics, the second from the prices of the trade journals. By means of the ratio between the two in this overlapping year, the index for 1919–21 was shifted to the 1890–99 base.[21]

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[17] Average monthly prices are given for hides in 1897–1908, bar iron 1890–1905, pork and print cloths from 1902 on, and pig iron and cottonseed oil from 1913 on.

[18] Such adjustments were made for print cloths in 1914, worsted yarns in 1908, bar iron in 1906, and cottonseed oil in 1912.

[19] Interpolating forward by this method from April 1918 gave one set of results, interpolating backward from June 1919, another. The figures actually inserted were weighted geometric means of these two sets.

[20] For footnote, see p. 364.

Comparison of Our Ten-Commodity Index with Other Indices

Our ten-commodity price index was constructed upon the basis of our study of fluctuations in prices of commodities for the period 1903–14. The index registers emphatically the business cycles of that twelve-year period and, as shown by Chart I, fluctuates in sympathy with the general commodity index of the Bureau of Labor Statistics. These are inevitable results of the methods used in its construction. But Charts I and II show also that the cyclical fluctuations of our index are closely similar to those of the Bureau's index during the other years, 1900–02 and 1915–21, for which that index is available in monthly form.

For the ten-year period before 1900, comparison is made in Chart VI with Falkner's quarterly index of commodity prices. To construct this index, Falkner (1) computed relative prices as of the first of each quarter for 142 commodities, using as base the average price for the nine quarters January 1890 to January 1892, inclusive and (2) took a mean of the relatives.[22] Our series was thrown into comparable form by shifting the index for the first month in each quarter to the base corresponding to Falkner's base.

The fruits of this comparison are twofold. Outstanding is the close resemblance between the movements of the curves. Not only their major fluctuations but also most of their minor movements correspond in time and in direction. The violence of fluctuations, however, is greater in our index than in Falkner's, especially the violence of fluctuations downward. Apparently our curve exaggerates declines during this period in much the same way that it exaggerates increases in the period from 1899 on. The direction of its fluctuations for 1890–99, however, are clearly supported by comparison with Falkner's index.

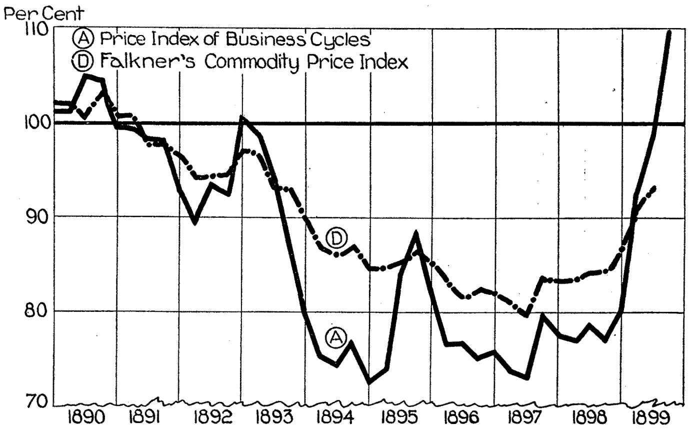

Chart VI. — Price Index of Business Cycles Compared with Falkner's Commodity Price Index, Quarterly, 1890–99

(*Average of nine quarterly prices January 1890–January 1892 = 100.* The price index of business cycles is a simple geometric mean of prices of 10 commodities; Falkner's index is an arithmetic mean of 99 series of relative prices, derived from 142 series of actual prices by averaging the relatives of different descriptions of the same article to form a single series.)

A comparison of the cyclical fluctuations of our index and that of Bradstreet's, available for the period 1899–1921, is shown in Charts II and VII. The degree of correspondence between the two is greater than between our index and that of the Bureau. In fact, the correspondence between our index and Bradstreet's is so close that a detailed analysis of the constitution of Bradstreet's, in order to determine the reason for the similarity, is desirable.

Bradstreet's index is the aggregate of the prices per pound of 96 commodities; there are 13 groups of commodities, making up the total, for each of which Bradstreet's gives the aggregate. These group aggregates have been transcribed for the period 1903–14, plotted on tracing paper, compared with Bradstreet's general index, and sorted into two classes. The classes are first, those having cyclical fluctuations similar to the general index, and second, those having cyclical fluctuations dissimilar to the general index. This twofold classification is as follows, in order of magnitude of the group aggregates:

(A) *Bradstreet's groups which fluctuate* like *the general index:*

Textiles — similarity very high.

Provisions — similarity moderate; trend is strongly upward.

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[20] Following is a detailed comparison of descriptions quoted by the Bureau of Labor Statistics with those of *Bradstreet's* and the other journals:

Commodity	Description	
	Bureau of Labor Statistics	Trade journals
Coke	Connellsville furnace	Connellsville
Pig iron	Foundry, No. 2, northern, Pittsburgh	Foundry, No. 2, southern, Birmingham
Bar iron	Common, from mill, Pittsburgh	Common, Chicago
Pork	Salt mess, old to new	New mess
Hides	Green, salted, packers', heavy native steers	Native steer, No. 1
Print cloths	27-inch, 64 by 60, 7.60 yards to the pound, general market	64's, Boston
Sheetings	Bleached 10–4, Pepperell	Brown cotton, southern 3 yards
Worsted yarns	2–32's, crossbred stock	Bradford spun, 2–32's, domestic, ¼ blood
Cottonseed oil	Summer yellow, prime	Crude, prime
Pig zinc	Western, New York	St. Louis

[21] In effect the process followed was this:

During the period 1890–1918 relative prices were computed for each commodity by dividing its actual monthly prices (adjusted where necessary) by its arithmetic average price, 1890–99. The data of the Bureau of Labor were used. Monthly indices were then computed by taking in each month an unweighted geometric mean of the 10 relative prices.

During the period 1919–21 a similar process was followed with data from the trade journals, 1919 being taken as base. The indices with base 1919 were then shifted to the base 1890–99.

[22] In taking the mean of the relatives, he "departed from the simple average method of allowing to each article equal weight, and instead combined the relative prices of similar articles to form one series of relative prices, to be used as one article only in calculating the index number for groups and for all commodities." *U.S. Bureau of Labor Statistics Bulletin 173*, Wesley C. Mitchell, "The Making and Using of Index Numbers," p. 128.

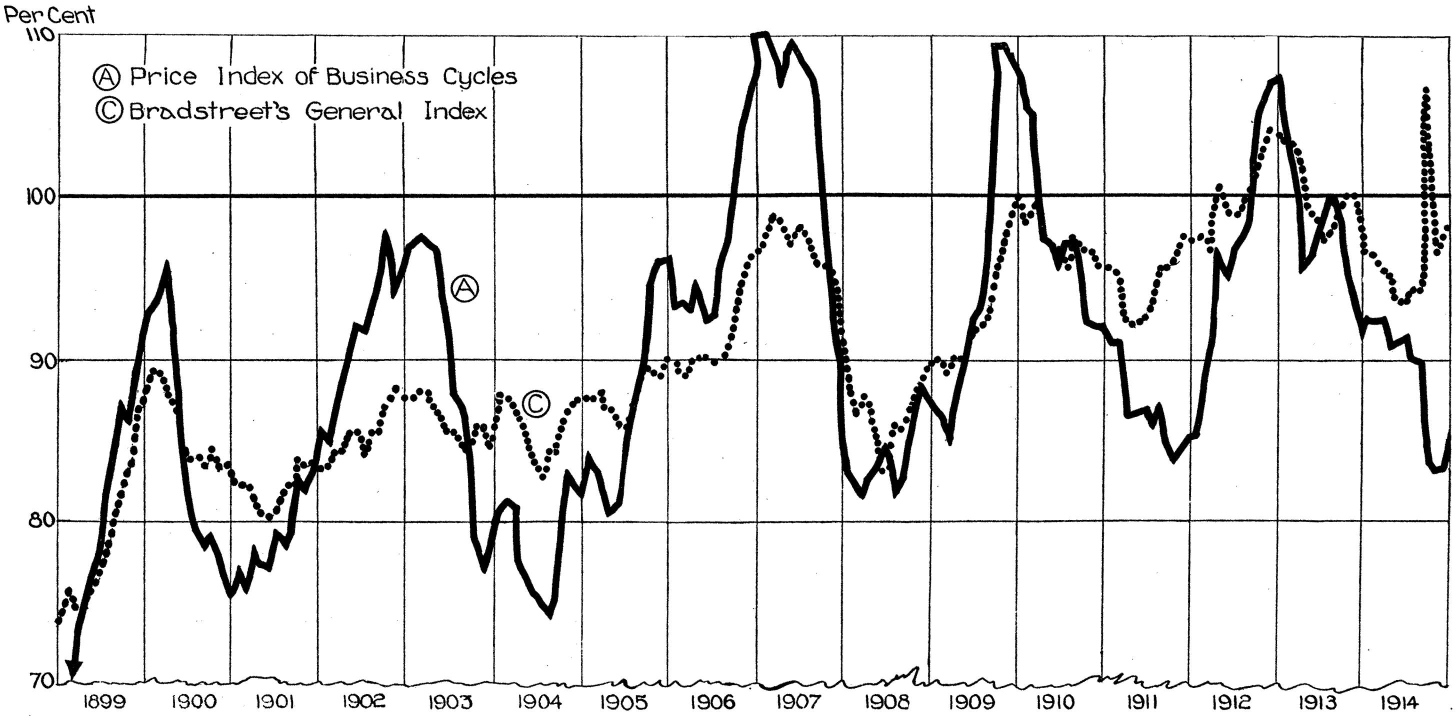

CHART VII. — THE PRICE INDEX OF BUSINESS CYCLES COMPARED WITH BRADSTREET'S GENERAL INDEX OF COMMODITY PRICES, MONTHLY, 1899–1914.

(*Average of 1913 = 100.* The price index of business cycles is a simple geometric mean of prices of 10 commodities; Bradstreet's index is an aggregate of actual per pound prices, reduced to percentages.)

Hides and leather — similarity good except in 1913–14, when prices of this group, unlike the general index, continue to rise.
Building materials — similarity good.
Coal and coke — similarity good.

(B) *Bradstreet's groups which fluctuate* unlike *the general index:*
Metals — peaks in 1907 and 1912 only.
Chemicals and drugs — peaks in 1907 and 1912 only.
Live stock — cyclical fluctuations not marked.
Oils — peaks in 1907, 1909, and 1910.
Miscellaneous — less unlike the general index than any other group in this class; greatest disagreement in 1911–13.
Fruits — peaks in 1907 and 1911–13.
Naval stores — peaks in 1907 and 1911 only.
Breadstuffs — irregular fluctuations with peaks in 1904–07–09–10–12–14.

If we find the sums of (A) the aggregates for the five groups, each of which has cyclical fluctuations similar to the general index, and (B) the aggregates for the eight groups, each of which has cyclical fluctuations unlike the general index, and then plot the two sums, we obtain the curves A and B in Chart VIII. It is evident from this chart that class A contributes about two-thirds of the general aggregate, and that the cyclical fluctuations of Bradstreet's index (A + B) result from the fluctuations of class A, which in turn result from the homogeneous constituent groups.

It is clear, then, that the cyclical fluctuations of Bradstreet's index are contributed by the five groups, textiles, provisions, hides and leather, building materials, coal and coke. But examination will reveal that the contributions to the result by the different groups vary greatly. The following table gives the percentage distribution of Bradstreet's grand aggregate among the classes and groups for three dates: July 1, 1909, a pre-war "normal"; February 1, 1920, the post-war peak of prices; and September 1, 1921, after the rapid decline of 1920–21.

PERCENTAGE DISTRIBUTION OF BRADSTREET'S AGGREGATE BY GROUPS OF COMMODITIES

	July 1, 1909*	Feb. 1, 1920	Sept. 1, 1921
Class A	*68.99*	*70.02*	*68.37*
Textiles	28.72	34.46	25.58
Provisions	24.54	21.09	27.79
Hides and leather	14.74	13.27	13.35
Building materials	.92	1.14	1.53
Coal and coke	.07	.06	.12
Class B	*31.01*	*29.98*	*31.63*
Metals	6.63	5.13	5.07
Chemicals and drugs	7.33	5.68	9.56
Live stock	4.49	3.17	3.63
Oils	4.98	5.21	4.03
Miscellaneous	3.31	5.84	4.22
Fruits	2.04	2.30	3.21
Naval stores	.84	1.57	.87
Breadstuffs	1.39	1.08	1.04

* The relative importance of the different groups of commodities in Bradstreet's aggregate is radically different from that of the industries corresponding to those commodities, as determined by the census figures for 1909. Thus the percentage distribution of Bradstreet's aggregate and of the total "value added by manufacture" according to the Census of Manufactures is as follows:

	Bradstreet's	Census
Textiles	28.72	15.4
Provisions, live stock, fruits, and breadstuffs	32.46	8.8
Hides and leather	14.74	3.8
Metals	6.63	20.1
Other	17.45	51.9

In class A the influence of the groups for building materials and coal and coke is negligible, the totals for these groups being less than 2 per cent of Bradstreet's aggregate. It is clear, therefore, that Bradstreet's index fluctuates as it does because of the influence of three groups only, i. e., textiles, provisions, hides and leather. It will now be interesting to ascertain just what commodities in each of these three groups are probably responsible for the cyclical fluctuation of the groups.

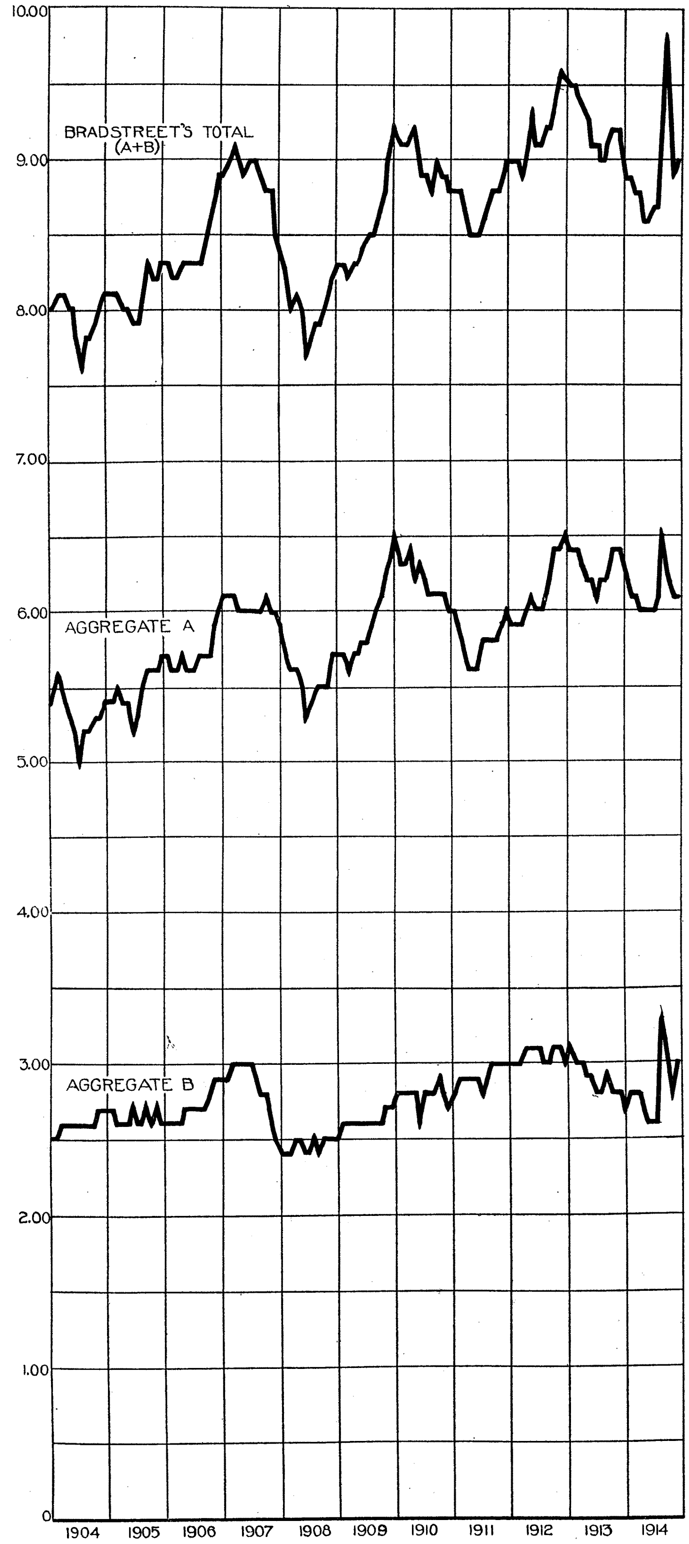

Chart VIII. — Comparison of Bradstreet's General Index of Commodity Prices with (A), the Aggregate of Constituent Groups that Fluctuate like the General Index, and (B) the Aggregate of Constituent Groups that do *not* Fluctuate like the General Index.

(Within aggregate A come textiles, provisions, hides and leather, building materials, coal and coke. Within aggregate B come breadstuffs, live stock, metals, oils, naval stores, building materials, chemicals and drugs, and miscellaneous commodities.)

In *Bradstreet's* of July 10, 1897, are published the prices per pound of the 96 commodities composing the index of July 1, 1897. By using this list it is possible to ascertain precisely what commodities enter into Bradstreet's index at that date and also at the present time. Of the 106 commodities in Bradstreet's listed on September 10, 1921 ten are not included in the index.[23] If we use conversion factors in order to get prices per pound we can ascertain the amounts contributed to the groups by various important constituent commodities. The exhibit for September 1, 1921, thus computed, is as follows:

Constitution of Bradstreet's Index on September 1, 1921

	Dollars	Percentage distribution
General index	*11.0868*	*100.0*
Class A	*7.5794*	*68.4*
Textiles, raw and manufactured:		
Cotton fabrics	1.8460	16.7
Wool, raw	.6200	5.6
Other	.3700	3.3
Provisions and groceries:		
Milk, eggs, butter and cheese	.9488	8.6
Cured pork and beef, and lard	.7635	6.9
Miscellaneous provisions	1.3684	12.4
Hides and leather	1.4800	13.3
Building materials	.1691	1.5
Coal and coke:		
Coal	.0077	*
Coke	.0059	*
Class B	*3.5074*	*31.6*
Metals:		
Iron and steel	.0815	.7
Other metals	.4802	4.3
Seven other groups	2.9457	26.6

* Less than $\frac{1}{10}$ of 1 per cent.

From this table it appears that cotton fabrics, hides and leather, and cured meats, formed 37 per cent of Bradstreet's index on September 1 of this year; and while this per cent does not hold exactly for other times, these three classes of goods constitute at least one-third of the general index. Now these articles which are important in Bradstreet's are also important in our index: sheetings, print cloths, hides, and salt pork number four of our 10 commodities. Three other of the ten, namely, pig iron, coke, and cottonseed oil, appear in Bradstreet's index, but have such small weight there that they do not affect the total appreciably. In fact, pig iron and cottonseed oil do not have enough influence to swing even the metal and oil groups of which they are a part into agreement with the general index. Our three remaining price series, spelter, worsted yarns, and bar iron, Bradstreet's omits entirely; yet they have recorded accurately basic changes in business.

(*Text concluded on page 368.*)

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[23] See p. 597. The ten excluded are: apples, peanuts, silk, silver, quicksilver, cement, opium, quinine, rubber, and ground bone.

TABLE I. — SERIES USED IN CONSTRUCTING PRICE INDICES FOR AGRICULTURE, MINING, AND SIX GROUPS OF MANUFACTURING INDUSTRIES *

I. AGRICULTURE

Commodity, with description in 1914	Type of quotation	Weight §
Barley†: fair to good malting, by sample	Spot	2.3
Corn: contract grades	"	32.8
Cotton: Upland, middling	"	16.2
Flaxseed†: No. 1	"	.7
Hay: timothy, No. 1	Not stated	15.8
Oats: contract grades	Spot	8.9
Potatoes†: white, good to choice	Not stated	4.5
Rice: domestic, choice, head	Spot	.4
Rye: No. 2	"	.5
Sugar: 96° centrifugal	"	3.3
Tobacco: Burley, dark red, good leaf	Not stated	2.1
Wheat†: No. 1 northern spring	Spot	12.5

II. MINING

Commodity, with description in 1914	Type of quotation	Weight §
Anthracite coal: chestnut	Contract	10.76
Bituminous coal: Pittsburgh, run of mine	"	25.93
Coke: Connellsville furnace	Range of spot and half yearly delivery	6.48
Copper: ingot, electrolytic	Spot	10.20
Lead: pig, desilverized	Not stated	2.14
Petroleum: crude	" "	9.94
Pig iron: foundry, No. 2, northern	Spot	25.93
Silver: bar, fine	Not stated	2.14
Zinc: pig, western	Early delivery	2.08

III. MANUFACTURE

Industry and commodity, with description in 1914	Type of quotation	Weight §
(a) FOOD AND KINDRED PRODUCTS		
Butter, Cheese and Condensed Milk	......	*10.75*
Butter†: Creamery, firsts	Spot	8.68
Cheese: State, whole milk, colored average, fancy	"	2.07
Slaughtering and Meat Packing	......	*43.01*
Bacon: Short, clear sides, smoked, loose	Not stated	5.17
Beef: fresh, native sides	" "	15.52
Hams: smoked, loose	" "	5.17
Hides: green, salted, packers', heavy native steers	" "	3.22
Lard: prime, contract	Future	6.34
Mutton: dressed	Not stated	2.41
Pork: salt, mess, old to new	" "	5.17
Flour-mill and Gristmill Products	......	*32.26*
Flour ‡ (1): wheat, standard patents	Not stated	14.38
Flour ‡ (2): wheat, winter straights	" "	14.38
Meal: corn, fine white	" "	3.50
Beet Sugar and Cane Sugar Refining	......	*13.98*
Sugar: granulated, in bbls.	Net cash	13.98
(b) TEXTILES AND THEIR PRODUCTS		
Cotton Manufactures	......	*65.00*
Cotton thread: 6-cord, 200-yd. spools, J. & P. Coats	Not stated	2.98

III. MANUFACTURE — Continued

Industry and commodity, with description in 1914	Type of quotation	Weight §
(b) TEXTILES AND THEIR PRODUCTS (continued)		
Cotton Manufactures (continued)		
Cotton yarns: carded, white, mule-spun, northern, cones, 10–1	Not stated	16.45
Denims: Amoskeag, 28-inch, 2.20 yds. to the pound	Net cash	3.23
Drillings: brown, Pepperell, 29-inch, 2.85 yds. to the pound	" "	2.72
Ginghams: Amoskeag, 27-inch, 6.37 yds. to the pound	" "	4.79
Print cloths†: 27-inch, 64 by 60, 7.60 yds. to the pound	" "	15.55
Sheetings (1): bleached, 10–4, Pepperell	" "	4.30
Sheetings (2): bleached, 10–4, Wamsutta, S. T.	" "	4.30
Sheetings (3): brown, 4–4, Indian Head, 2.85 yds. to the pound	" "	4.30
Sheetings (4): brown, 4–4, Pepperell R, 3.75 yds. to the pound	" "	4.30
Shirtings: bleached muslins, 4–4, Fruit of the Loom	" "	2.07
Woolen and Worsted Goods	......	*35.00*
Overcoatings†: soft faced, black, plain twill, 24 ounce, 54–56 inch	Net cash	6.18
Suitings (1): clay worsted diagonal, 16 ounce, 56–58 inch, Washington Mills	" "	3.92
Suitings † (2): Middlesex, wool-dyed blue, 55–56 inch, 15 ounce	" "	3.92
Suitings † (3): serge, 11 ounce, 56–58 inch, Fulton Mills 3192	" "	3.92
Women's dress goods † (1): all wool, cashmere, 8–9 twill, 35-inch, Atlantic Mills 3602	" "	3.92
Women's dress goods (2): cotton warp, cashmere, 9 twill, 4–4, Atlantic Mills F	" "	1.80
Women's dress goods † (3): cotton warp, cashmere, 36-inch, Hamilton	" "	1.80
Women's dress goods† (4): poplar cloth, cotton warp and worsted filling, 36-inch	" "	1.80
Worsted yarns† (1) 2–32's, crossbred stock	Not stated	3.87
Worsted yarns (2): 2–40's, Australian fine	" "	3.87
(c) IRON AND STEEL		
Blast Furnaces	......	*20.00*
Pig iron, foundry, etc.	See mining, above	20.00
Steel Works and Rolling Mills	......	*80.00*
Bar iron † (1): common, from mill	Not stated	11.43
Bar iron (2): best refined	" "	11.43
Nails: wire, 8-penny, fence and common	" "	11.43
Steel billets: Bessemer	Early shipment (one to three months)	11.43

For footnotes, see p. 368.

TABLE 1. — Continued

III. MANUFACTURE (Continued)

Industry and commodity, with description in 1914	Type of operation	Weight §
(*c*) IRON AND STEEL (continued)		
Steel Works and Rolling Mills (cont'd)		
Steel sheets: black, No. 27, box annealed, cold rolled, U. S. standard	Early shipment (spot to three months)	11.43
Wire (1): fence, barbed, galvanized	Not stated	11.43
Wire (2): bare copper, No. 8, B. & S. gauge and heavier (base sizes)	“ “	11.43
(*d*) LEATHER AND ITS FINISHED PRODUCTS		
Leather, Tanned, Curried, and Finished	......	*33.33*
Calf leather†: chrome, dull or bright finish, B grade	Not stated	8.33
Harness leather: oak, 17 lbs. and up, No. 1	“ “	8.33
Sole leather (1): hemlock, middles, No. 1	“ “	8.33
Sole leather (2): oak, scoured backs, heavy, No. 1	“ “	8.33
Boots and Shoes	......	*66.67*
Men's shoes: vici kid, Goodyear welt.	Net cash	33.33
Women's shoes†: gun metal, McKay sewed, button, mat cab. top, cap toe, ½ double medium sole, 1¼ inch military heel	“ “	33.33
(*e*) CHEMICALS AND ALLIED PRODUCTS		
Coke: Connellsville, etc.	See Mining	14.28
Cottonseed meal: prime	Not stated	7.14
Cottonseed oil‡: summer yellow, prime	Spot	7.14
Glycerin: refined, chemically pure, in bulk	Not stated	9.52
Lead: carbonate of white, American, in oil	“ “	21.46
Petroleum (1): refined, for export, in barrels, cargo lots, standard white, 110° fire test	“ “	7.14
Petroleum (2): refined, 150° fire test, water white, in bbls.	Not stated	7.14
Rosin: common to good, strained	“ “	3.57
Sulphuric acid: 66°	“ “	19.04
Turpentine: spirits of southern, in bbls.	Spot	3.57
(*f*) STONE, CLAY, AND GLASS PRODUCTS		
Brick: common, red, domestic building	Not stated	41.7
Cement: Portland, domestic	Spot	41.7
Plate glass†: polished glazing, area 5 to 10 square feet	Not stated	8.3
Window glass: American, single strength, thirds, 25-inch bracket (6 by 8 to 10 by 15 inches)	Net cash	8.3

This analysis shows that Bradstreet's aggregate really registers, not the cyclical fluctuations of 96, but of only a few commodities. Our ten-commodity price index (1) contains the chief commodities which give Bradstreet's its cyclical movement together with (2) other commodities of importance which are not of influence on Bradstreet's aggregate.

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* Information concerning the types and sources of the quotations is incomplete at some points because of lack of full detail in the *Bulletins* and trade journals. In 37 of 81 series, for example, it was impossible to ascertain from available sources whether prices quoted were cash or contract. Of the remaining cases, however, 37 were found to be cash, bearing out the Bureau's statement that its "general practice" is "to employ spot prices rather than contract prices, wherever both are available." (Letter from Acting Commissioner of Labor Statistics, Chas. E. Baldwin, March 8, 1921.) Again, for 28 commodities, chiefly in the textile group, no source is stated, though presumably data were secured from "leading manufacturers or their selling agents." Of the other series, 47 are referred to trade journals or newspapers, and a few to miscellaneous sources. Regarding markets and frequency of quotations, information is fuller. The bureau aims to quote prices for each article in its primary market. Where several cities are important in its sale, price is quoted for the general market; i. e., for the several cities together. All the textile and leather prices, 27 in number, refer to the general market. Pittsburgh prices are given for most of the iron and steel products, and Chicago prices for the cereals and some food products. In mining and in the food, chemical, and stone groups, however, the New York market predominates. Most of the quotations, from whatever market, are monthly, but agricultural and food products are quoted weekly because of their frequent price changes. Except for a few series for which either a range or an average is given, all prices pertain to a single day of the week or month. On the whole, it appears that the commonest form of quotation is a monthly cash price of the commodity in its primary market, the quotations being taken from the standard trade journals.

Various changes of description, unit, market, etc., occurred during 1903–14. Doubtless many changes, like those in the textile series in 1914, are more apparent than real, and represent simply greater detail in the published description of the article. But minor real changes are numerous. Thus, in 1913 and 1914, the sources of quotations for more than a dozen articles in the agricultural and iron and steel groups changed. Not infrequently quotations for a single day each week or month replaced the weekly or monthly range or average, and vice versa; or quotations shifted from a monthly to a weekly basis. A transfer of market for copper wire quotations took place in 1912. Even the unit employed appears from the original sources to have been altered in two or three cases, as bituminous coal in 1911 and 1912, and rosin and cement in 1914. Considering changes like these as minor, however, the Bureau of Labor Statistics treated quotations before and after them as continuous. Only when the price of a commodity was appreciably altered by a change in description or method of quotation did the Bureau make any adjustment between earlier and later prices. At least one series in every group shows such an adjustment; in agriculture 4 series show adjustments, in mining 2, in textiles 8, in food 3, and in leather 2. Half of them occurred in 1913–14, and the other half from 1905–12. Practically all of these substitutions represent changes in the quality or grade of the article quoted, accompanied sometimes by change also in unit or market, etc. On winter wheat flour and cottonseed oil the description remained the same, but in the first case the unit and market and in the second case the unit changed. Discussing the reliability of series in which adjustments have been made, the Bureau says: "Where new articles have been introduced by substitution, it is believed that the substituted articles represent in general the same demand which was formerly met by the discontinued articles. The relative prices consequently show the percentage fluctuations in the prices of practically identical articles or articles that represent the same trade demand throughout the period covered." (United States Bureau of Labor Statistics, *Bulletin No. 181*, p. 240.) If this view of substitutions is correct, then despite the minor changes of which the Bureau has made no account, it is probably true for the 81 series selected that "prices . . . which have been carried throughout the period . . . are fairly comparable." (*Ibid.*)

† A material change in the description of this commodity occurred between 1903 and 1914, but was taken account of in the relatives computed by the Bureau of Labor Statistics.

‡ A material change in method of quotation occurred for this series between 1903 and 1914, but was taken account of in the relatives computed by the Bureau of Labor Statistics.

§ Actual values have been converted into percentages.

TABLE 3. — PRICE INDEX OF BUSINESS CYCLES: MONTHLY, 1890–1921

(The Index is a simple geometric average of prices for the first of each month of ten commodities relative to their geometric average price for 1890–99 as base. The commodities are: pig iron, bar iron, coke, spelter, hides, cotton sheetings, print cloths, worsted yarns, salt mess pork, and cottonseed oil.)

Date	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905
January	114.7	112.7	105.1	113.8	90.8	81.9	93.3	85.9	87.9	90.7	132.7	108.5	122.2	138.9	114.2	117.2
February	115.2	111.1	105.4	119.4	88.6	79.0	92.2	85.5	88.2	93.9	133.4	110.0	121.5	139.4	115.7	120.2
March	115.1	111.0	103.3	118.8	87.4	78.7	90.4	84.9	88.4	99.9	135.2	109.0	124.4	139.8	116.3	119.7
April	114.5	112.6	101.5	112.1	85.0	83.9	86.7	83.6	87.1	104.8	136.9	111.6	126.8	138.9	115.8	117.3
May	116.2	111.2	101.2	111.2	84.9	86.0	86.7	81.8	88.8	106.9	131.7	110.8	129.2	138.5	110.5	115.6
June	118.6	111.6	102.4	108.7	83.8	91.0	86.8	82.3	90.2	110.3	124.1	110.6	131.4	134.5	109.6	116.1
July	118.9	111.1	105.6	106.6	84.2	94.6	86.8	82.7	89.0	111.5	116.5	113.3	131.0	132.1	108.0	117.3
August	120.2	112.4	106.3	98.2	88.9	95.2	83.3	85.2	88.1	116.8	113.2	112.3	132.3	125.9	107.4	122.6
September	119.9	110.8	105.7	95.4	90.8	95.5	83.3	88.8	88.3	120.3	112.4	113.8	136.4	124.4	106.7	125.3
October	118.2	111.0	104.6	98.1	86.8	99.7	85.2	90.3	87.3	124.4	112.8	118.3	139.6	121.0	108.0	129.0
November	118.4	106.2	105.9	97.8	84.1	96.7	86.4	89.1	87.4	123.4	111.4	117.6	135.1	113.3	112.4	135.0
December	117.2	106.2	110.7	93.9	83.2	91.5	88.0	87.4	87.0	128.8	109.8	119.2	136.8	110.6	118.3	137.7
Av. for year	117.5	110.7	105.4	106.4	86.8	89.9	87.5	85.8	88.3	111.8	123.2	113.2	131.1	130.8	112.3	123.1

Date	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
January	138.0	154.0	127.2	125.8	154.6	131.9	122.2	153.8	131.7	121.2	176.4	251.4	307.4	304.2	363.4	202.3
February	133.2	157.2	119.4	124.8	151.5	130.3	122.6	149.6	132.5	127.1	181.5	252.6	311.5	286.4	370.2	193.3
March	134.0	157.5	117.7	123.7	150.1	130.2	126.0	145.9	132.5	129.1	193.0	266.0	314.8	270.2	374.0	178.1
April	133.1	153.2	117.0	122.0	144.5	126.2	130.4	142.7	132.1	131.1	192.3	272.5	321.4	262.0	372.2	159.8
May	135.5	154.0	118.2	125.7	139.4	124.4	138.1	136.8	130.0	138.5	195.4	280.2	327.2	267.6	395.2	158.9
June	132.1	156.0	119.6	128.2	138.8	124.6	136.3	138.4	130.2	146.4	194.6	310.5	329.3	298.1	395.8	160.8
July	132.8	156.8	121.2	132.7	136.9	124.9	138.5	141.8	130.9	148.1	191.0	327.2	329.8	312.4	382.4	155.8
August	136.5	154.6	120.4	133.6	139.0	123.3	139.0	143.0	129.2	143.9	187.5	319.7	331.2	332.6	355.9	152.4
September	139.0	153.3	117.4	140.1	139.1	125.0	141.0	142.9	128.8	145.0	193.0	324.5	332.5	325.6	334.2	158.9
October	142.3	151.8	118.3	151.5	135.4	121.4	146.3	140.7	120.3	152.2	207.5	302.1	337.1	314.0	317.6	169.9
November	149.4	142.9	121.3	156.3	132.7	120.1	150.3	137.5	119.2	157.3	238.3	308.9	340.2	338.4	268.0	....
December	152.8	130.3	126.6	156.3	131.9	121.4	153.3	133.3	119.5	166.6	251.1	305.1	336.5	353.3	227.6	....
Av. for year	138.5	152.3	120.9	135.2	141.6	125.5	137.4	142.9	128.2	143.6	202.0	295.3	326.6	307.5	353.0	....